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ABSTRACT

Data on the nutritional quality of Hawaiian children's diet, arranged by age and ethnic group, are presented in this paper. The data are drawn from a random sampling of the diets of 890 students. Tables show mean nutritional intake and the percent of calories from protein, carbohydrate and fat for elementary, junior high and senior high school levels. The tables reveal a general decrease in the nutritional quality of diets as students get older. In addition, it is shown that secondary level females had the poorest diets, with over 70 percent having iron intakes less than two thirds of the Recommended Dietary Allowance (RDA). The paper points out that a substantial portion of the surveyed children showed less than two thirds of the FDA for intake of calcium, vitamin A, thiamin, and vitamin C. It is also noted that the study indicated high intakes of sodium, cholesterol, and saturated fatty acids and relatively high caloric intakes from snacks and high sugar foods. (Author/APM)

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Ethnic Differences in the Nutritiousness of Diets of Hawai'i's Children

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Paper presented at the annual meeting of the
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As an integral part of a comprehensive, statewide nutrition education needs assessment (Lai & Shimabukuro, 1980), data on the nutritiousness of diets of a stratified, random sample of 890 students were collected by means of 24-hour diet recalls. Data were analyzed in terms of the 1980 Recommended Dietary Allowances (RDA) and the recommendations of the U.S. Senate Select Committee on Nutrition and Human Needs (1977). A total of 28 dietary components were included in the analysis.

There was a general decrease in the nutritional quality of diets as the students got older. Secondary-level females had the poorest diets: over 70% of secondary school girls had iron intakes less than two-thirds of the RDA. Other nutrients for which a substantial proportion of the children showed less than two-thirds of the RDA were calcium, vitamin A, thiamin, and vitamin C. Other findings of concern included high intakes of sodium, cholesterol, and saturated fatty acids and relatively high caloric contribution from snacks and high-sugar foods.

Although the sampling for the study was not specifically designed for analyzing ethnic differences, such data were collected and proved to indicate trends and possible major implications for teaching nutrition to different ethnic groups. Each ethnic group has particular food and taste preferences and beliefs associated with food. Recommendations and educational programs for helping students improve their diets must consider the lifestyle and cultural priorities influencing their food consumption habits.

Identification of Ethnic Group

Ethnic identification in multi-ethnic Hawai'i has always been a problem for researchers. Not only are there numerous ethnicities represented, none of whom constitutes a majority, but in many cases, people are of mixed ancestry. Further complicating the situation is a strong historical precedent of (a) including "part-Hawaiian" as a category (but not including "part-Japanese," "part-Samoan," etc.) and (b) separating the Asian groups into "Japanese," "Filipino," "Korean," etc. but not subdividing the Caucasian group.

Given all of these circumstances, it was decided that for the purpose of the study, it was sufficient and appropriate to obtain information about ethnicity by asking the following question: "With which ethnic group do you identify? (Check one only) ____ Hawaiian _____ Japanese ____ Korean ____ Black ____Chinese ____ Filipino ____ White (haole) ____ Samoan ____ Other (specify)." Persons who were of mixed ethnic background but who did not identify with any single group were classified as "Other."

Table 1 shows the ethnic composition of the diet recall sample in comparison to available Statewide data. Because of the relatively small percentages (Statewide) for several ethnic groups (only four groups accounted individually for 10% or more of the State's population), the attempts to obtain a general representative sample resulted understandably in small numbers selected from the Samoan, Korean, and Black groups.

Table 1 goes here

Method

Although the combined (all ethnic groups together) analysis looked at the percentage of students below two-thirds the RDA for certain nutrients, the analysis of ethnic differences focused on differences among mean intakes. This latter method of analysis facilitated the search for trends among the intakes of nutrients for which (a) RDA were available for comparison, and (b) estimated rate and adequate daily dietary intakes (ranges) were provided by the Food and Nutrition Board, National Academy of Sciences, National Research Council (1980).

The Recommended Dietary Allowances (RDA) represent levels which would be adequate to meet the known nutritional needs of practically all healthy persons (say about 95% of the population). An individual whose intake is below RDA is not necessarily at nutritional risk. In the following analyses comparisons are made between the RDA and the group mean intakes; however, one should not interpret "a group's mean intake being above the RDA" as meeting a standard. Nor should one consider a group whose mean is below the RDA as not having met a standard. The RDA in this analysis simply serve as aids to making comparisons among the ethnic groups.

Table 2 goes here

Results

Elementary School, Grade 5 (mean age = 10)

Although the students of Asian ancestry tend to be of smaller stature than the Hawaiian, Samoan, or Caucasian groups, exact adjustments could not be made because no individual anthropometric data were collected. Gross adjustments, however, were possible, and in some cases, relative comparisons were feasible when the mean intake of certain other nutrients acted as a control. For example, whereas Hawaiian, Japanese, and Chinese students all had about the same mean intake of protein (84-80 gm), the Hawaiian group had a definitely high mean intake of fat (93 gm vs. 80 gm and 84 gm). Because fat contributes more calories to the diet than protein or carbohydrate, the Hawaiian group had the highest mean calorie intake among all ethnicities. The percent of calories contributed by protein, carbohydrate, and fat to the total diet, however, is similar for all ethnicities. Proportionately, the Filipino group consumed the lowest percent of calories from fat. The mean calcium intake of the Filipino group was also low; the other ethnicities' means all met the RDA. On the other hand, the diets of Filipino fifth graders were the only ones whose mean sodium intake was within the estimated safe and adequate daily dietary intake. All other group means exceeded the upper range of the sodium standard.

Tables 3 and 4 go about here

Only the Caucasians' mean intake of thiamin (vitamin B_1) met the RDA, whereas all group means exceeded the riboflavin (vitamin B_2) RDA. The diets of Korean students were the lowest in niacin, vitamin A and vitamin C but relatively high in sugar consumption. Sugar intake from high-sugar foods was greatest among Hawaiians and least among Chinese, a difference of 33.6 gm daily.

Junior High School, Grade 8 (mean age = 13)

There were only two Samoans and four Koreans in this part of the sample; accordingly, these two ethnic groups are not included in this aspect of the analysis.

Like the fifth graders, junior high Hawaiian students consumed on the average the most fat and calories. Comparatively, however, percentage of calories from protein, carbohydrate and fat was similar for all ethnic groups. Only the Caucasian group had a mean calcium intake above RDA. The groups of Asian ancestry were the lowest in calcium intake. All groups were substantially substandard in iron intake. Caucasians and Chinese showed mean sodium intakes greater than considered safe.

Tables 5 and 6 go about here

The Japanese, Filipino, and "Other" groups were substantially below RDA for vitamin A. Only Hawaiians, Caucasians, and "Others" were on the average above the RDA (the lower limit of 1.1 set for girls) for thiamin (vitamin B_1) comsumption, whereas the juniors of Asian ancestry like the fifth graders had the lowest mean thiamin intake. Hawaiians and Caucasians were also the champion high-sugar food consumers.

Senior High, Grade 11 (mean age = 16)

Because only two Black students were in the sample, that ethnic group was not included in this analysis.

In contrast to the lower grade levels, Hawaiians no longer account for the highest caloric intake. In fact, Korean, Chinese, and Samoan students consumed on the average more calories. The contribution of calories from protein, carbohydrate, and fat to the total diet indicate a comparatively high percentage of calories from fat in the food intake of Caucasian students. Although Korean students consumed a high mean calorie intake, the percent of calories from fat was relatively low.

Tables 7 and 8 go about here

Diets of Japanese students were the lowest in thiamin, riboflavin, niacin, and vitamin A. Low intake of vitamin A was also found in diets of Korean and Samoan students. All groups, led by the Filipino and Japanese, consumed a substantial amount of sugar in high-sugar foods such as soda and candy.

General Trends

Across all three age levels only the Caucasian groups' mean intake of calcium exceeded the RDA. All secondary level ethnic groups had mean intake of iron below the RDA. More than half of the age-ethnic groups (including all the Caucasian age groups) had sodium intakes above the estimated safe upper range. Mean intakes of phosphorus, potassium, riboflavin (vitamin B_2), niacin, and vitamin C across all ethnic groups generally met the 1980 RDA standards. Vitamin A, total caloric, carbohydrate, and high-sugar food intake differed, sometimes dramatically, among the various age-ethnic groups. Elementary and junior high students of most ethnic groups had means below the RDA for thiamin (vitamin B_1) while the senior high ethnic groups had means which generally exceeded the RDA.

Given these somewhat diversified results, it is clear that across the (ethnic) board nutrition recommendations may sometimes not be appropriate. Where substantial deficiencies exist for some or all ethnic groups (such as is the case for iron, vitamin A, calcium, and thiamin), any remediation recommendations must take into account cultural differences in food consumption patterns: for example, ethnic differences in lactose intolerance are grounds for caution against proffering increased milk consumption as a remedy for insufficient calcium intake. More generally, the study revealed areas in which nutrition education must take into account not only ethnic differences in existing nutritional problem areas but also instructional differences related to ethnicity.

A careful study of the raw data to determine what food choices students made and where and when food was eaten would be helpful in further understanding their food comsumption habits as they relate to nutritional well-being. A description of particular ethnic patterns would provide valuable information in designing a food and nutrition curriculum which is culturally appropriate to meet the needs of Hawai'i.

REFERENCES

Recommended Dietary Allowances (9th rev. ed.). Washington, D.C.: National Academy of Sciences -- National Research Council, 1980.

Select Committee on Nutrition and Human Needs: Dietary goals for the United States (2nd ed.). Washington, D.C.: U.S. Government Printing Office, Dec. 1977.

Table 1. Ethnic Distribution of Diet Recall Sample

Ethnicity	Elementary	Junior High	Senior High	State*
Caucasian	20%	13%	14%	26%
Japanese	18%	22%	18%	25%
Hawaiian	26%	22%	22%	20%
Filipino	20%	24%	23%	10%
Chinese	3%	3%	3%	4%
Samoan	3%	1%	4%	1%
Korean	2%	1%	2%	1%
Black	0%	0%	1%	1%
Other	8%	14%	12%	11%

* From the Department of Planning and Economic Development, The State of Hawaii Data Book, 1979.

Table 2

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL

RECOMMENDED DAILY DIETARY ALLOWANCES,[a] REVISED 1980

Nutrient	Elementary Males and Females	Junior High Males	Junior High Females	Senior High Males	Senior High Females
Age	7 -- 10 years	11 -- 14 years		15 -- 18 years	
Protein (g)	34	45	46	56	46
Fat (g)[b]	35% of dietary energy				
Carbohydrate (g)[b]	reduction refined sugar intake; increase complex carbohydrate				
Calcium (mg)	800	1200	1200	1200	1200
Phosphorus (mg)	800	1200	1200	1200	1200
Iron (mg)	10	18	18	18	18
Sodium (mg)[c]	600--1800	900 -- 2700		900 -- 2700	
Potassium (mg)[c]	1000--3000	1525 -- 4575		1525 -- 4575	
Vitamin A (R.E.)	700	1000	800	1000	800
Thiamin (mg)	1.2	1.4	1.1	1.4	1.1
Riboflavin (mg)	1.4	1.6	1.3	1.7	1.3
Niacin (mg)	16	18	15	18	14
Vitamin C (mg)	45	50	50	60	60
Calories (kcal)	2400	2700	2200	2800	2100

a. The allowances are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stress.

b. No recommended levels have been established but these guidelines are given.

c. Estimated safe and adequate daily dietary intakes provided in form of ranges of recommended intakes.

Table 3. Elementary: Mean Intake by Ethnicity

Ethnicity	Hawaiian	Chinese	Japanese	Korean	Filipino	Caucasian	Samoan	Other
N	86	10	60	6	65	67	9	27
Protein (g)	86	85	84	65	78	77	95	85
Fat (g)	93	80	84	73	76	87	86	89
Carbohydrate (g)	269	200	232	204	242	266	234	264
Calcium (mg)	852	882	895	839	685	1079	846	903
Phosphorus (mg)	1274	1177	1213	1039	1105	1492	1279	1356
Iron (mg)	11.95	10.3	10.3	9.4	10.6	11.3	12.2	12.1
Sodium (mg)	2416	2031	2478	1829	1684	2286	2326	2530
Potassium (mg)	2124	2016	2838	1787	2093	2951	2810	2299
Vitamin A (R.E.)	1289	717	759	609	700	1078	625	688
Thiamin (B_1) (mg)	1.1	0.9	0.9	0.8	1.0	1.2	1.1	1.3
Riboflavin (B_2) (mg)	1.96	1.8	1.7	1.6	1.6	1.99	2.1	1.9
Niacin (mg)	16.9	15.0	15.6	10.9	16.7	15.8	16.9	16.2
Vitamin C (mg)	79	94	86	37	109	123	107	87
Total Gram Amount	1784	1525	1618	1416	1632	1760	1715	1784
Total Calories	2220	1804	1980	1679	1926	2098	2078	2177
Total Sugar (g)	51.0	17.4	36.2	46.1	44.1	44.2	21.6	44.0
Candy Sugar	10.9	1.8	6.7	13.9	8.2	15.1	7.8	10.6
Soda Sugar	31.1	12.6	20.4	28.2	30.5	19.3	13.2	25.8
Other Sugar	9.0	3.1	9.0	3.95	5.4	9.9	0.6	7.6

Table 4. Percent of Calories from Protein, Carbohydrate, and Fat: Elementary

	Hawaiian	Chinese	Japanese	Korean	Filipino	Caucasian	Samoan	Other
Total Calories	2220	1804	1980	1679	1926	2098	2078	2177
Protein	15%	18%	17%	15%	16%	14%	18%	15%
Carbohydrate	37%	39%	37%	38%	34%	36%	37%	36%
Fat	48%	43%	46%	47%	49%	49%	45%	48%

Table 5. Jr. High: Mean Intake by Ethnicity

Ethnicity	Hawaiian	Chinese	Japanese	Korean	Filipino	Caucasian	Samoan	Other
N	62	8	63	4	67	37	2	38
Protein (g)	97	96	89	89	83	90	101	90
Fat (g)	110	90	99	108	88	95	132	94
Carbohydrate (g)	329	255	275	230	268	295	292	273
Calcium (mg)	982	685	855	1202	709	1222	585	818
Phosphorus (mg)	1521	1194	1419	4098	1118	1594	1434	1374
Iron (mg)	13.5	12.1	11.99	10.97	10.6	11.7	12.9	11.8
Sodium (mg)	2650	2892	2399	4154	2305	3001	5098	2349
Potassium (mg)	3197	1839	2591	2474	2530	2940	2068	4264
Vitamin A (R.E.)	820	837	686	1466	616	1142	216	711
Thiamin (B_1) (mg)	1.2	0.9	1.0	0.99	0.98	1.1	0.8	1.2
Riboflavin (B_2) (mg)	2.0	1.5	1.8	1.7	1.6	2.1	1.7	1.8
Niacin (mg)	18.6	16.4	16.98	15.6	15.8	15.3	20.6	18.1
Vitamin C (mg)	98	137	97	80	75	105	9	125
Total Gram Amount	2207	1958	1928	1826	1724	2100	1833	1841
Total Calories	2650	2229	2312	2241	2173	2330	2773	2270
Total Sugar (g)	74.4	46.2	57.2	12.4	55.6	69.3	70.95	42.8
Candy Sugar	15.0	2.3	12.8	0.0	10.96	22.0	17.1	11.3
Soda Sugar	49.8	38.4	39.3	11.2	38.4	32.4	51.9	24.2
Other Sugar	9.5	5.5	5.1	1.2	6.2	14.8	1.95	7.3

Table 6. Percent of Calories from Protein, Carbohydrate, and Fat: Junior High

	Hawaiian	Chinese	Japanese	Filipino	Caucasian	Other
Total Calories	2650	2229	2312	2173	2330	2270
Protein	14%	16%	16%	15%	15%	16%
Carbohydrate	37%	37%	35%	36%	36%	37%
Fat	49%	46%	49%	49%	49%	47%

Table 7. Sr. High: Mean Intake by Ethnicity

Ethnicity	Hawaiian	Chinese	Japanese	Korean	Filipino	Caucasian	Samoan	Other	Black
N	61	9	51	5	65	40	12	34	2
Protein (g)	108	112	88	108	98	100	114	86	81
Fat (g)	115	123	93	106	106	118	124	101	97
Carbohydrate (g)	355	384	282	329	305	309	349	293	279
Calcium (mg)	969	1134	909	1380	907	1336	863	879	576
Phosphorus (mg)	1516	1673	1348	2095	1401	2218	1794	1328	1054
Iron (mg)	13.95	14.2	10.2	12.0	12.9	13.3	17.0	12.3	13.0
Sodium (mg)	2700	3041	2358	3051	3115	2981	3792	3143	3024
Potassium (mg)	2886	4082	3633	3880	2750	3944	2582	2869	2274
Vitamin A (R.E.)	1199	1120	622	736	969	1418	757	891	511
Thiamin (B_1) (mg)	1.3	1.6	1.0	1.4	1.3	1.3	1.3	1.1	1.1
Riboflavin (B_2) (mg)	2.2	2.4	1.8	2.9	2.0	2.7	2.2	1.8	1.3
Niacin (mg)	20.5	24.2	16.1	28.9	18.8	21.3	24.6	17.1	21.2
Vitamin C (mg)	155	270	117	142	149	135	82	124	230
Total Gram Amount	2560	2717	2081	3662	2239	2554	2747	2098	1700
Total Calories	2882	3049	2278	3096	2536	2828	3046	2415	2275
Total Sugar (g)	62.6	64.3	69.2	47.4	77.1	53.7	61.2	55.6	19.1
Candy Sugar	13.6	18.2	11.8	0.8	15.6	11.6	6.6	8.6	0.0
Soda Sugar	43.2	37.4	53.4	36.3	55.5	32.7	48.0	42.7	15.0
Other Sugar	5.8	8.6	4.1	10.3	6.1	9.4	6.6	4.3	4.1

Table 8. Precent of Calories from Protein, Carbohydrate, and Fat: Senior High

	Hawaiian	Chinese	Japanese	Korean	Filipino	Caucasian	Samoan	Other
Total Calories	2882	3049	2278	3096	2536	2828	3046	2415
Protein	15%	14%	15%	16%	15%	15%	15%	14%
Carbohydrates	36%	36%	36%	34%	37%	39%	38%	38%
Fat	49%	50%	49%	50%	48%	46%	47%	48%